

**VOLUNTARY CORRECTIVE ACTION WORK PLAN
RCRA FACILITY INVESTIGATION
NAVAL SUPPORT ACTIVITY MEMPHIS**

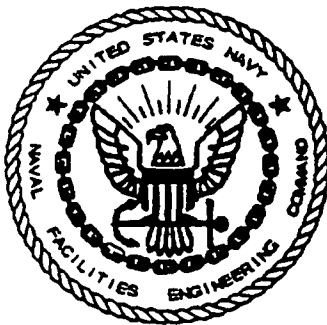
**FORMER BUILDING N-6 UNDERGROUND WASTE
TANK REMOVAL**

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Revision: 1

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CTO-0094

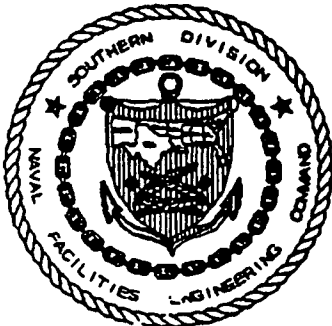


Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Prepared by:

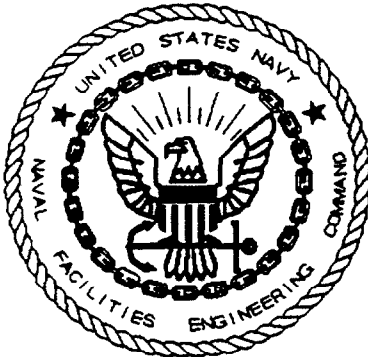
EnSafe/Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134
(901) 383-9115



September 16, 1997

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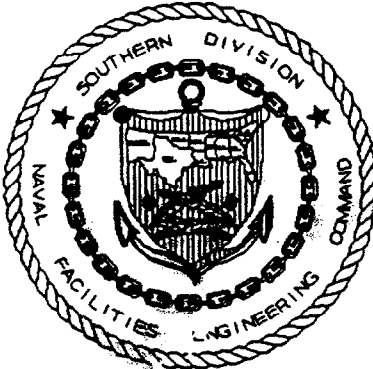
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The Contractor, EnSafe/Allen & Hoshall, hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0318 are complete, accurate, and comply with all requirements of the contract.

Date: September 16, 1997
Signature: Lawson Anderson
Name: Lawson Anderson
Title: Task Order Manager

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ABBREVIATIONS AND ACRONYMS

AOC	Area of Concern
API	American Petroleum Institute
ASTM	American Society for Testing and Materials
CHASP	Comprehensive Health and Safety Plan
DOT	U.S. Department of Transportation
DRO	Diesel Range Organics
E/A&H	EnSafe/Allen and Hoshall
FOD	Foreign Objects and Debris
f'c	Concrete compression strength at 28 days (in pounds per square inch)
GRO	Gasoline Range Organics
NFPA	National Fire Protection Association
NSA	Naval Support Activity
PWO-ED	Public Works Office-Environmental Division
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SOUTHNAVFACENGCOM	Southern Division, Naval Facilities Engineering Command
SOW	Statement of Work
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leachate Procedure
TDEC	Tennessee Department of Environment and Conservation
TPH	Total Petroleum Hydrocarbons
UWT	Underground Waste Tank
VCA	Voluntary Corrective Action
VOC	Volatile Organic Compounds
μg/kg	microgram per kilogram

1.0 INTRODUCTION

As part of the U.S. Navy Installation Restoration Program, the following Voluntary Corrective Action (VCA) work plan has been prepared by EnSafe/Allen & Hoshall (E/A&H) for the removal of an underground waste tank (UWT) at former Building N-6 at Naval Support Activity Memphis in Millington, Tennessee. This VCA work plan will be implemented by the Charleston Naval Shipyard Detachment (Detachment) and E/A&H.

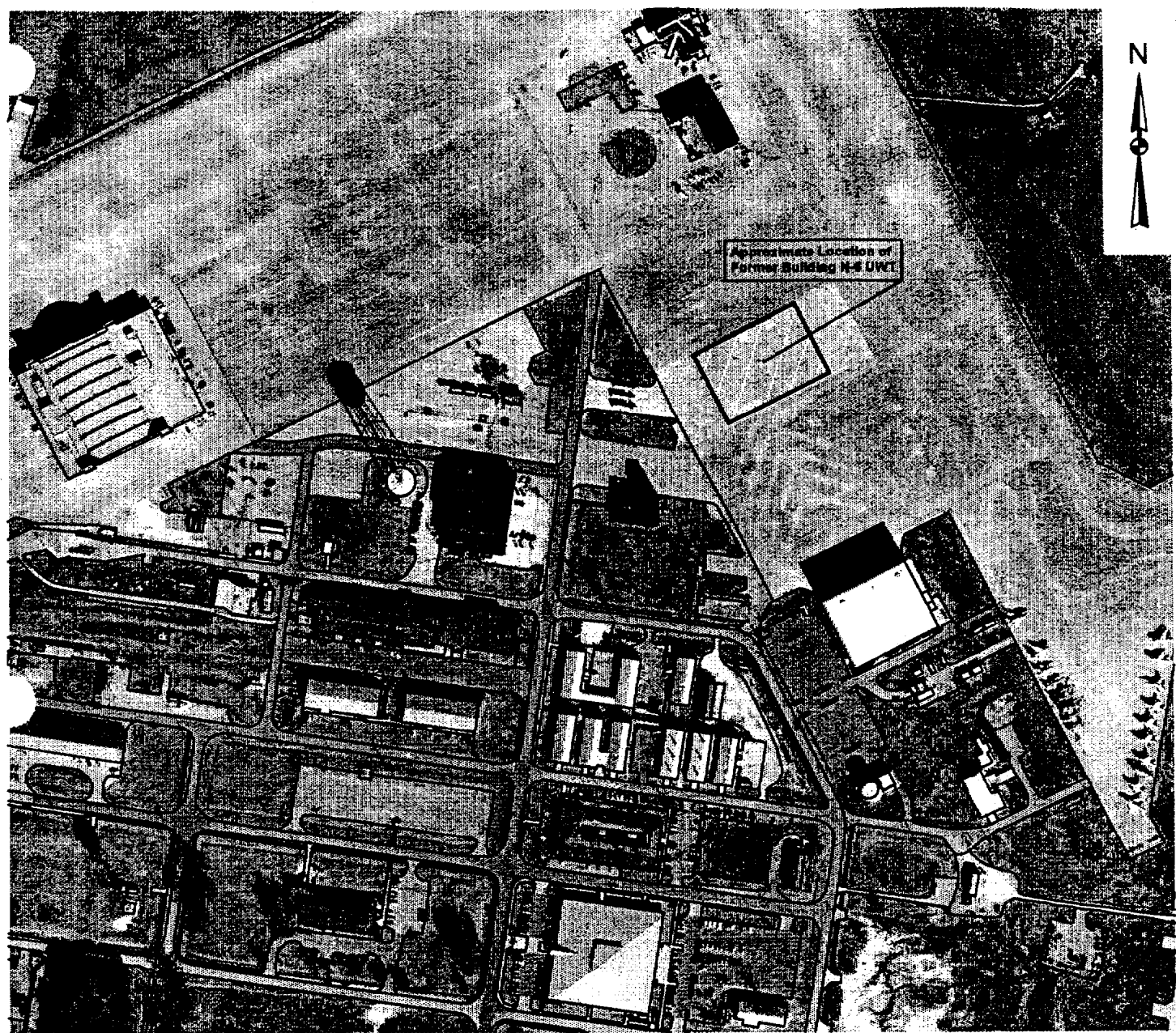
The goals of this VCA are to:

- Determine if any material remains in the UWT
- Characterize any material remaining in the UWT
- Remove the UWT
- Determine if soil is contaminated in the Building N-6 UWT area

The Building N-6 UWT removal will be conducted in accordance with applicable federal, state, and local laws and regulations. The primary reference for this VCA work plan is the *Comprehensive RFI Work Plan* (E/A&H, 1994).

2.0 SITE DESCRIPTION AND BACKGROUND

Building N-6, constructed as a hangar in 1942, is 600 feet south of Building N-4, the Control Tower (Figure 2-1). Construction drawings indicate that Building N-6 housed a metal shop, tool room, supply room, photographic laboratory, and classrooms that were added in 1943. Several other upgrades occurred between 1948 and 1980. Building N-6 was demolished in 1986; however, the footprint (i.e., concrete slab) of the building still is still present in the Millington Airport operational area.



250 0 250 500 750 Feet



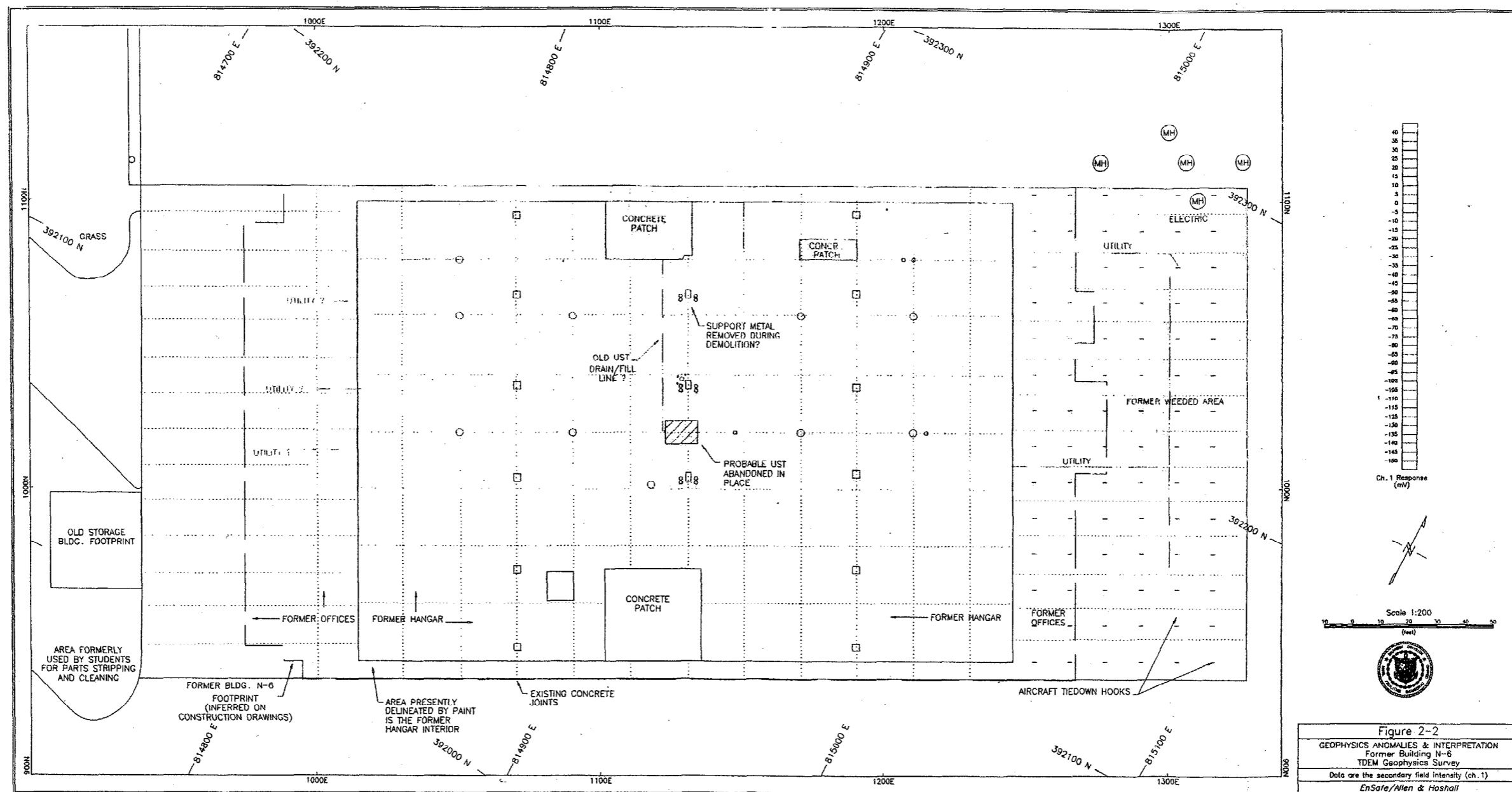
VOLUNTARY CORRECTIVE ACTION
NAVAL SUPPORT ACTIVITY MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 2-1
Vicinity Map
Former Building N-6
UWT

John Landsittel, a former instructor at Building N-6, was interviewed in the fall of 1996 by Larry Hughes of E/A&H and Rob Williamson of the NSA Memphis Public Works Office-Environmental Division (PWO-ED). Mr. Landsittel was interviewed because the distribution of chlorinated solvents detected in groundwater during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) suggested a potential source beneath the former building. Mr. Landsittel said that Building N-6 once housed a UWT which received hydraulic fluid, lubricating oil, solvents, and other liquid materials generated in the hangar. He thought it likely that chlorinated-solvent waste was also poured into the UWT. He did not know the size or depth of the UWT, but thought it was present when he was assigned to the building in approximately 1960. Construction drawings from 1942-1943 do not show the UWT, suggesting it was added after the original construction.

Mr. Landsittel said that a release may have occurred when the UWT is reported to have overflowed in 1978 and PWO-ED subsequently pumped out the tank and sealed it in place. In a walkover of the site, he pointed out what he thought was the UWT's former position, which lies nearly at the center of the former building. A geophysical survey subsequently identified an anomaly within the center of the building footprint (Figure 2-2), corresponding with the location identified by Mr. Landsittel (E/A&H, 1997). Based on the geophysical survey, the UWT, or tank pit, is presumed to be approximately 8 feet wide and 12 feet long, with a drain/fill line extending 60 feet to the northwest. The concrete apron for the runway presently overlies the UWT.

Both soil and groundwater samples have been collected from around the former Building N-6 area as part of the ongoing RFI being conducted at NSA Memphis. The RFI has identified chlorinated solvents in the fluvial deposits groundwater, the shallow most aquifer beneath the NSA Memphis Northside. As part of the Area of Concern A (Northside Fluvial Deposits Groundwater) investigation, the former Building N-6 vicinity was considered a possible source area due to past



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operations and information obtained from Mr. Landsittel, who said that chlorinated solvents were used to kill weeds on a grassy strip once on the northeast side of the hangar.

Elevated concentrations of chlorinated solvents have been detected in the upper part of the fluvial deposits aquifer in the area of Buildings N-6 and N-10 (designated as solid waste management unit 21). Groundwater samples collected from the upper part of the fluvial deposits next to the northeast side of the Building N-6 footprint contained trichloroethylene at 117 micrograms per liter ($\mu\text{g/L}$), 1,1-dichloroethylene at 79.7 $\mu\text{g/L}$, 1,2-dichloroethane at 44.2 $\mu\text{g/L}$, bromo-chloromethane at 31.9 $\mu\text{g/L}$, and carbon tetrachloride at 10.3 $\mu\text{g/L}$.

Based on the information obtained during the RFI and from interviews with NSA Memphis personnel, the Navy has initiated a VCA.

3.0 TANK REMOVAL

The following sections outline the required actions before, during, and after the removal of the former Building N-6 UWT. The UWT will be removed by the Detachment following the procedures outlined in this VCA work plan, and the Southern Division Naval Facilities Engineering Command Statement of Work (SOW) shown in Appendix A.

Because the Building N-6 UWT is in the operational area of the Millington Municipal Airport, barricades with flashing lights and construction fencing will be used at all times. The site will be kept free of all foreign objects and debris (FOD) that may damage aircraft in the area.

3.1 Concrete Cutting

An area of the concrete apron, approximately 15 feet by 15 feet, will have to be removed to gain access to the UWT. In addition, if a fill/drain line is identified during UWT removal, then a trench will be cut to gain access to the piping for removal. The apron is typically 10 inches thick

and consists of nonreinforced concrete with river-rock aggregate. The concrete will be removed using a concrete saw and jackhammer or backhoe combination. The opening will be made with smooth edges, oriented with the apron's current expansion joints.

If underground piping is present, additional concrete will be removed to gain access to it. All cuts in the apron for this purpose will be made perpendicular to the expansion joints.

3.2 Tank Extraction

All soil overlying the UWT will be removed, exposing the top of the tank. Before proceeding with the UWT removal, the following procedures, outlined in the *Final Tank Closure Plan* (E/A&H, 1995), will be followed. The soil removed will be placed directly into a lined, roll-off container and sampled as described in Section 3.3.2 of this work plan.

3.2.1 Tank Contents Removal and Disposal

According to NSA Memphis personnel, the UWT contents were removed in 1983. However, if any material (e.g., liquid, sludge) remains in the UWT, it will be removed in accordance with National Fire Protection Association (NFPA) 30 *Flammable and Combustible Liquids Code*, and *American Petroleum Institute (API) 1604 Removal and Disposal of Used Underground Storage Tanks*. If fire or explosion hazards result from an underground storage tank release of flammable or combustible material, procedures will be followed as outlined in NFPA 329, *Recommended Practice for Handling Underground Releases of Flammable and Combustible Liquids*. All recovered material will be containerized in the appropriate U.S. Department of Transportation (DOT)-approved container, characterized by E/A&H personnel, and turned over to the NSA Memphis PWO-ED.

3.2.2 Tank and Piping Removal and Disposal

The UWT, a nonregulated tank, will be disposed of by the NSA Memphis PWO-ED. Any soil above the tank will be removed and placed in a lined roll-off box for disposal characterization. The tank will be removed following the procedures outlined in Appendix 5 of the Tennessee Underground Storage Tank Act (Acts 1988, ch. 984, §2; TCA., §68-53-101), where applicable. If piping is present, as indicated by the geophysical survey, it will be removed according to the tank removal SOW. If necessary, the piping and UWT will be cut into pieces small enough to fit into a transport trailer and transported to a scrap yard for recycling, as directed by the PWO-ED.

3.2.3 Excavation and Disposal of Soil and Concrete

The soil and concrete excavated during the UWT removal will be placed directly into a lined roll-off container. Once the UWT has been removed, areas of obvious contamination (e.g., visual staining or organic-vapor monitor readings) will be overexcavated to the extent of the backhoe's reach, or until groundwater is encountered (approximately 12 to 15 feet below land surface [bls]), before confirmation samples are collected (Section 3.3).

3.3 Soil Sampling

E/A&H will collect both confirmation samples and disposal characterization samples in accordance with the *NSA Memphis Comprehensive RFI Work Plan*.

3.3.1 Confirmation Samples

Confirmation samples will be collected from the tank pit's bottom and side walls and from along the pipeline, if present. So that personnel do not have to enter the excavation (eliminating a confined-space entry scenario), samples will be collected with a backhoe bucket, as follows: The top 6 inches of soil will be removed from the designated locations using the backhoe bucket. The backhoe bucket will be brought to the surface, and a representative sample will be collected from

the center. Six confirmation samples collected from the tank pit will be submitted for analysis of volatile organic compounds (VOC), total petroleum hydrocarbons (TPH) by U.S. Environmental Protection Agency Method 418.1, TPH-gasoline range organics (GRO), and TPH-diesel range organics (DRO), as outlined in Table 3-1.

Table 3-1
Sample Summary and Analytical Requirements

Sample Type	Matrix	Estimated No. ^a	Composite/Grab	Analytical Parameters	Turnaround
Confirmation	Soil	6	Grab	VOCs (EPA Method 8240) DRO (TN Modified 8015) GRO (TN Modified 8015) TPH (EPA Method 418.1) Metals (EPA Method 6010/7000 series)	28 days
Soil Disposal	Soil	6	Composite	TCLP VOCs ^b TCLP TPH ^b TCLP Metals ^b	7 days

Notes:

- a — The actual number of samples to be collected will be dictated by field conditions (e.g., the dimensions of the excavated area and the volume of soil for offsite disposal).
- b — "TCLP" denotes the extraction process. Methods used for the analysis of the extract will be EPA Method EPA 8240 (VOCs), EPA Method 418.1 (TPH), and EPA Method 6010/7000 series (metals).

3.3.2 Disposal Characterization Samples

Sampling of the excavated soil thought to be contaminated will follow the procedures outlined in the Tennessee Department of Environment and Conservation (TDEC) *Technical Guidance Document — 005* (Appendix B). Disposal-characterization samples will be submitted for Toxicity Characteristic Leachate Procedure (TCLP) VOC, TCLP-TPH, and TCLP lead analyses (Table 3-1).

3.4 Site Restoration 1

Site restoration will involved backfilling the hole and replacing the concrete/apron in the excavated 2
area. 3

3.4.1 Backfilling 4

Immediately after excavation is complete, the Detachment will backfill the tank pit to within 5
12 inches of the apron surface with Tennessee DOT aggregate size #8 pea gravel (control fill — 6
GW/GP per American Society for Testing and Materials [ASTM] Standard 2487). 7

3.4.2 Concrete Replacement 8

The concrete will be replaced according to the following specifications: 9

- The edges of the exposed concrete will be painted with ¼-inch of neat cement paste 10
immediately before to replacing concrete. 11
- Concrete will have a compressive strength at 28 days of 4,000 pounds per square inch 12
($f'_c=4,000$). 13
- Concrete shall have 6% \pm 1% entrained air. 14
- Concrete coarse aggregate gradation shall be ASTM C33-90 No. 467. 15
- Concrete coarse aggregate shall be crushed limestone. 16
- Concrete slump shall be 4 inches \pm 1 inch. 17
- Concrete shall be given a broom finish. 18

Lighted barricades will remain in place around the concrete patch for at least 72 hours after concrete is poured.

3.5 Analytical Requirements

Analytical requirements for the samples collected for confirmation and disposal purposes are summarized in Table 3-1. Level III-equivalent data quality objectives will be used for all confirmation sample analyzes. Six confirmation soil samples will be collected and analyzed for VOCs, GRO, DRO, and TPH.

3.6 Sample Management

Samples will be managed in accordance with Sections 4.12 and 5 of the *Comprehensive RFI Work Plan*.

3.7 Sample Custody

Sample custody will be maintained in accordance with Section 4.12.5 of the *Comprehensive RFI Work Plan*.

4.0 PROJECT RESPONSIBILITIES

4.1 Charleston Naval Shipyard Detachment Responsibilities

Before and during the UWT removal activities at the former Building N-6 UWT area, the Detachment will be tasked to:

- Conduct all UWT removal and site restoration activities as outlined in this *VCA Work Plan* and the Navy's SOW (Appendix A).

- Provide assistance to the Millington Municipal Airport Authority, the Navy, and the NSA Memphis PWO-ED, as necessary. 1
2

4.2 EnSafe/Allen & Hoshall Responsibilities 3

Before and during the soil removal activities at the former Building N-6 UWT area, E/A&H will be tasked to: 4
5

- Collect samples from any sludges and/or rinse water associated with the UWT, soil, and/or piping removal at former Building N-6. 6
7
- Collect disposal samples from any stockpiled soil associated with the UWT removal in the former Building N-6 area. 8
9
- Collect soil samples from the tank pit to confirm that established cleanup goals have been achieved. 10
11
- Arrange subcontract laboratory services for all samples. 12
- Provide documentation of the removal and the confirmation sampling results, in the form of a Technical Memorandum, to the Base Closure and Realignment Cleanup Team (BCT). 13
14
- Provide assistance to the Detachment, the Millington Municipal Airport Authority, the Navy, and the NSA Memphis PWO-ED, as necessary. 15
16

5.0 QUALITY ASSURANCE PLAN

The Quality Assurance Plan presented in Section 4.14 of the *Comprehensive RFI Work Plan* will be followed for sampling activities conducted during removal of the former Building N-6 UWT.

6.0 DATA MANAGEMENT PLAN

The Data Management Plan presented in Section 5 of the *Comprehensive RFI Work Plan* will be followed for sampling activities conducted during removal of the former Building N-6 UWT.

7.0 HEALTH AND SAFETY PLAN

During confirmation sampling, E/A&H personnel will comply with the Comprehensive Health and Safety Plan (CHASP; Section 7 of the *Comprehensive RFI Work Plan*), included as Appendix C. The E/A&H CHASP establishes the minimum health and safety requirements to be fulfilled during fieldwork. The Detachment will prepare its own site-specific health and safety plan and submit it to TDEC for review and approval.

8.0 REFERENCES

API 1604: Removal and Disposal of Used Underground Storage Tanks

ASTM 2487: Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

ASTM C33-90: Specification for Concrete Aggregates

EnSafe/Allen & Hoshall. (1994). *Comprehensive RCRA Facility Investigation Work Plan*.
E/A&H: Memphis, Tennessee.

EnSafe/Allen & Hoshall. (1995). <i>Final Tank Closure Plan, Naval Support Activity Memphis.</i>	1
E/A&H: Memphis, Tennessee.	2
EnSafe/Allen & Hoshall. (1997). <i>Geophysics Investigation of Possible Underground Storage</i>	3
<i>Tanks, Former Buildings N-5 and N-6 and SWMU 23.</i> E/A&H: Memphis, Tennessee.	4
NFPA 30: Flammable and Combustible Liquids Code.	5
NFPA 329: Recommended Practice for Handling Underground Releases of Flammable and	6
Combustible Liquids.	7
Tennessee Department of Environment and Conservation. (1993). <i>Technical Guidance</i>	8
<i>Document — 005.</i> TDEC: Nashville, Tennessee.	9
Tennessee Underground Storage Tank Act (Acts 1988, ch. 984, §2; T.C.A., §68-53-101),	10
Appendix 5.	11

Appendix A
SOUTHNAVFACENGCOM Statement of Work
(To be provided by SOUTHDIIV)

Appendix B
TDEC Soil Sampling Guidance



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF UNDERGROUND STORAGE TANKS

TECHNICAL GUIDANCE DOCUMENT - 005

EFFECTIVE DATE - AUGUST 30, 1991
REVISED DATE - JUNE 30, 1993

RE: SAMPLING REQUIREMENTS FOR EXCAVATED SOIL

The purpose of this guidance document is to assist the regulated community in determining if excavated soil is contaminated or has been adequately treated. Discreet samples shall be collected from the excavated soil to determine if the level of petroleum contamination is below the Division's most stringent regulatory cleanup levels (10 PPM BTX and/or 100 PPM TPH).

PROCEDURES:

1. The total volume of excavated soil (in cubic yards) shall be determined and divided by ten (10). This is the total number of discrete samples to be collected for field screening purposes. If the result is not a whole number, round up to the next whole number.
 - a. Sampling points must be evenly distributed throughout the entire volume of soil. The resulting samples collected for field screening purposes shall be representative samples according to volume, rather than area.
 - b. All samples collected for field screening shall be retrieved from sufficient depth in the soil piles to ensure the collection of fresh, unweathered material. Surface samples are not acceptable.
2. Appropriate field screening techniques shall be used to determine which of the above samples contain the highest levels of contamination. These are to be submitted for laboratory analysis, in accordance with the table below.

VOLUME OF TREATED SOIL
(cubic yards)

NUMBER OF SAMPLES
FOR LAB ANALYSIS

0 - 60	1
60 - 240	2
240 - 480	3
480 - 720	4

Note: Each additional 240 cubic yards of material will require one additional sample for laboratory analysis.

3. After the results of all laboratory analyses are available, a report shall be submitted to the Division. This report shall include all results from both the field screening and laboratory analyses, as well as a scaled site map showing all sampling points.
4. Based on the information provided in the report, the Division shall make a determination concerning the ultimate disposition of the soil in question.

Appendix C
Comprehensive Health and Safety Plan

7.0 COMPREHENSIVE HEALTH AND SAFETY PLAN (CHASP)

A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) is being conducted at the Naval Air Station (NAS) Memphis, Tennessee. The purpose of this program is to assess the nature and extent of contamination at the site and to determine if follow-up action is required to maintain compliance with environmental regulations.

This Comprehensive Health and Safety Plan (CHASP) is applicable to field operations to be conducted during the RFI at NAS Memphis. The Navy project contract number with EnSafe/Allen & Hoshall (E/A&H) is N62467-89-D-0318. A Site-Specific Health and Safety Plan (SSHSP) will be developed and implemented to address site-specific activities and hazards.

The provisions of this plan are mandatory for E/A&H personnel and those personnel under contract to E/A&H or the Navy e.g., the United States Geological Survey (USGS) whose work responsibilities call for them to enter a work zone (See 7.3 Work Areas). Such personnel must read this plan and sign the plan acceptance form (See Attachment C) before starting site activities. In addition, such personnel will operate in accordance with the most current requirements of 29 CFR 1910.120, *Standards for Hazardous Waste Workers and Emergency Responders* (HAZWOPER). These regulations include the following provisions for employees exposed to hazardous substances, health hazards, or safety hazards: training as described in 120(e), medical surveillance as described in 120(f), and personal protective equipment (PPE) described in 120(g).

All non-E/A&H personnel present in E/A&H work areas shall either adopt and abide by this CHASP and the corresponding SSHSP or shall have their own safety plan which, at a minimum, meets the requirements of the E/A&H CHASP and SSHSP.

At least one person certified in CPR and First Aid will be present during field activities. In addition, the E/A&H employees that are onsite will be certified in CPR and First Aid.

7.1 Site Characterization

Upon review of available information, the following chemicals are representative of the types of chemical hazards (contamination) known or suspected to be present on NAS Memphis: benzene, toluene, ethylbenzene, xylene, polychlorinated biphenyls (PCBs), naphtha, waste oils, and cleaning solutions. SSHSPs shall be designed to protect workers from chemical hazards known or suspected to be present at a specific location. The following information will be included in the SSHSP:

- A site map displaying the location of planned work areas within the site
- The expected site-specific contaminants of concern and the (suspected) magnitude and scope of the situation
- Decontamination procedures
- A material safety data sheet (MSDS) for each contaminant known or expected of being present

7.1.1 Work Areas

Site control for all work areas will be established and maintained according to the recommendations in the EPA's *Interim Standard Operating Safety Guides*, Revised September, 1982. Three general zones of operation, each described below, will be established to reduce the potential for contaminant migration and risk of personnel exposure:

- The exclusion zone (EZ) or "hot zone"

- contamination reduction zone (CRZ), and the
- support zone (SZ)

Field personnel shall enter the SZ and don their PPE, then they will move through the CRZ and into the EZ. After completing their work or when taking a break they will leave the EZ through the CRZ, decontaminate themselves and their equipment, and leave the area through the SZ.

The exclusion zone is the area being investigated, sampled, or otherwise of interest. It is where chemical contamination is known or suspected to exist. The EZ includes the work area except for areas set aside as either the CRZ or SZ. The EZ will be defined and demarcated in the field; in the case of drilling, the EZ is typically about 50 feet in diameter with the borehole located in the middle.

Only authorized personnel that meet the training requirements of OSHA 29 CFR 1910.120 (40 hour HAZWOPER course/8-hour annual refresher course/24-hour supervised onsite training or equivalent) are permitted within the exclusion and contamination reduction zones. Documentation of these certifications will be maintained on site, as well as in the site trailer, at all times. Prior to entering the EZ, and at all times when in the EZ, all personnel shall be outfitted in and properly use all required PPE. A checkpoint may be established at the edge of the EZ to regulate the flow of personnel and equipment in and out of the area.

When using Level A, B, or C PPE, all personnel entering the EZ must use the "buddy system". All persons entering the EZ must be able to:

- Provide his or her partner with assistance
- Observe his or her partner for signs of chemical or heat exposure
- Periodically check the integrity of his or her partner's protective clothing
- Notify the shift supervisor, his representative, or others if emergency help is needed

Additionally, at least one person shall remain outside the EZ and have available at least the same level of PPE as those who entered the EZ. The person outside the EZ will provide logistical and safety support as needed.

The contamination reduction zone serves as a buffer between the EZ and the SZ and is intended to prevent the spread of contaminants from the work areas. All decontamination procedures will be conducted in this area. The CRZ shall be adjacent to and upwind of the EZ and include all decontamination stations. When leaving the SZ and entering the CRZ, personnel must be wearing the prescribed PPE. Exiting the CRZ requires the removal of all contaminants through compliance with established decontamination procedures as contained herein and in the corresponding SSHSP.

The support zone is the outermost area and is considered a non-contaminated or clean area. The support area will be equipped with an appropriate first-aid station and equipment to perform gross decontamination of health and safety equipment (e.g., air monitoring equipment). The SZ is adjacent to and upwind of the CRZ.

The actual location and boundary of work zones will be determined and demarcated in the field. Existing site conditions such as prevailing wind direction, location of utilities, roads, security, etc., shall be considered when determining zone locations.

Changes in meteorologic conditions or site conditions may necessitate relocating the CRZ or SZ. These conditions (e.g., wind direction, surface water run-off patterns, etc.) will be monitored at all times. A wind sock or similar device will be placed in a location visible to all site workers.

7.1.2 Work Area Access

A file will be maintained onsite that includes a current OSHA initial HAZWOPER training certificate (or copy) and an up-to-date refresher certificate for all employees involved in field activities. Employees that are unsure that a copy of their certificate is onsite shall bring a copy of their certificate with them and present it to the Site Health and Safety Officer before beginning field work. Personnel that fail to meet or abide by the criteria established in the CHASP or SSHSP shall be restricted from entering work areas.

Subcontractors, DOD oversight personnel, and other site visitors must provide the Site Health and Safety Officer with documentation showing that their HAZWOPER training is current and must agree to comply with this CHASP and the corresponding SSHSP or equivalent health and safety requirements prior to site entry. Personnel that fail to meet or abide by the criteria established in the CHASP or SSHSP shall be restricted from entering work areas.

The Site Health and Safety Officer may suspend site work and may instruct personnel to evacuate the area. Examples of situations when this may happen are:

- Site conditions have changed, for whatever reason, such that the SSHSP does not adequately address the current situation,
- Safety precautions being used are inadequate for the situation, or
- Personnel including E/A&H, subcontractors, visitors, or DOD are or may be exposed to an immediate health hazard.

7.1.3 Site History and Description

A review of the existing site data will be conducted to assess the potential hazards to be encountered by E/A&H and contractor personnel and addressed in the SSHSP. The location of NAS Memphis is shown on Figure 2-1, Vicinity Map.

7.2 Site Activities

Field activities to be conducted as part of this RFI (e.g., soil borings, well installations, and well development) are described in the E/A&H Comprehensive Sampling and Analysis Plan (CSAP). Specific health and safety procedures associated with specific activities, hazards, and/or sites are addressed in the appropriate SSHSP.

The Site Supervisor will manage the day-to-day field operations which includes assigning field staff to specific work tasks and coordinating any required logistical support. The Site Supervisor has the authority to suspend or postpone specific field operations if he or she believes that worker health and safety concerns have not been adequately addressed.

Certain activities present a level of hazard that must be dealt with on a case by case basis. These activities are neither covered by this CHASP nor by a SSHSP. Examples of such activities are: confined space entry; moving or sampling of unknown drums or containers; and entering excavations, trenches, or test pits that are more than three feet deep. Should the Project Manager or Site Supervisor deem it necessary to perform an activity such as those listed above, it is that person's responsibility to contact the Project Health and Safety Officer and request an addendum to the SSHSP specifying the health and safety procedures, training, and conditions necessary for undertaking that task. These activities are prohibited until the SSHSP addendum is reviewed, accepted, and implemented.

7.3 Chemical Hazards

Information about specific site chemical hazards will be provided in each SSHSP. Such information will include National Fire Protection Association (NFPA) ratings, symptoms of acute and chronic exposure, carcinogenicity, and OSHA permissible exposure limits (PELs). A table of exposure guidelines for expected site chemicals will be provided. Information in this table will include odor thresholds, OSHA PELs, American Conference of Governmental Industrial Hygienists threshold limit values (ACGIH TLVs), National Institute for Occupational Safety and

Health recommended exposure limits (NIOSH RELs), auto-ignition temperatures, and flammability ranges. Material Safety Data Sheets for these materials will be included in Attachment A of each SIP.

7.4 Operations and Physical Hazards

Field personnel should be aware of and act in a manner to minimize the dangers associated with physical hazards typically encountered during environmental investigations. These hazards include heat-related illnesses, uneven terrain, slippery surfaces, lifting, and use of heavy equipment. Electrical lines may be present either above or below ground, and underground gas lines may be present. Prior to the initiation of drilling activities, drilling locations must be cleared by the Naval Public Works Center (PWC).

Heavy equipment and drill rig operations will be conducted in accordance with the procedures outlined in Attachment A — *Drilling Safety Guide*, provided in this plan. Personnel conducting drill rig operations shall keep clear of all moving parts. To prevent entanglement with the drill rig, loose clothing shall not be worn. The Site Supervisor and Site Health and Safety Officer shall be aware of the potential for heat stress and other weather-related illnesses, and shall implement appropriate work regimens to minimize the likelihood of field personnel becoming ill. When conducting operations or survey work on foot, personnel will walk at all times. Running greatly increases the probability of slipping, tripping, and falling. When working in areas that support habitat for poisonous snakes, personnel shall wear protective chaps made of a heavy material designed to prevent snake bites to the legs.

7.5 Employee protection

Employee protection for this project includes standard safe work practices, NAS Memphis rules of conduct, PPE, personal decontamination procedures, equipment for extreme weather conditions, work limitations, and exposure evaluation.

7.5.1 Standard Safe Work Practices:

- Eating, drinking, chewing gum or tobacco, smoking, or any activity that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated, unless authorized by the Site Health and Safety Officer.
- Hands and face must be thoroughly washed upon leaving the work area.
- No contact lenses will be worn in work areas while invasive actions are conducted.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces, or lean, sit, or place equipment on drums, containers, or on soil suspected of being contaminated.
- Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel on cleanup or response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Consumption of alcoholic beverages is prohibited.
- Due to the possible presence of overhead power lines, adequate side and overhead clearance should be maintained to ensure that the drill rig boom does not touch or pass close to any overhead lines.

- Due to the possible presence of underground utilities (including electric, natural gas, water, sewer, telephone, etc.), the activity and local utility representatives should be contacted and requested to identify all lines at the ground surface using characteristic spray paint or labeled stakes. A 3-yard buffer zone should be maintained during all subsurface investigations.
- Due to the flammable properties of some of the potential chemical hazards, all spark or ignition sources should be bonded and/or grounded or mitigated before soil boring advancement or other site activities begin.

7.5.2 NAS Memphis General Rules of Conduct:

- Liquor, firearms, narcotics, tape recorders, and other contraband items are not permitted on the premises.
- Any violation of local, state, or federal laws, or conduct which is outside the generally accepted moral standards of the community is prohibited.
- Violation of the Espionage Act, willfully hindering or limiting production, or sabotage is not permitted.
- Willfully damaging or destroying property or removing government records is forbidden.
- Misappropriation or unauthorized altering of any government records is forbidden.
- Securing government tools in a personal or contractor's tool box is forbidden.
- Gambling in any form, selling tickets or articles, taking orders, soliciting subscriptions, taking up collections, etc., is forbidden.

- Doing personal work in government shop or office, using government property or material for unauthorized purposes, or using government telephones for unnecessary or unauthorized local or long distance telephone calls is forbidden.
- Compliance with posted signs and notices is required.
- Boisterousness and noisy or offensive work habits, abusive language, or any verbal, written, symbolic, or other communicative expression which tends to disrupt the work or morale of others is forbidden.
- Fighting or threatening bodily harm to another is forbidden.
- Defacing any government property is forbidden.
- Wearing shorts of any type and/or offensive logos, pictures, or phrases on clothing is forbidden. Shirts, shoes, and pants or slacks or coverall-type garments will be worn at all times on government property.
- All persons operating motor vehicles will obey all NAS Memphis traffic regulations.

7.5.3 Selection of Personal Protective Equipment

It is important that PPE be appropriate to protect against the potential or known hazards at each cleanup or investigation site. Protective equipment will be selected based on the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, based on past experiences and sound safety practices.

Table 7-1
 Level of Protection and Criteria

Level of Protection	Criteria for Use	Equipment
Level A	<ul style="list-style-type: none"> When atmospheres are "immediately dangerous to life and health" (IDLH in the NIOSH/OSHA Pocket Guide to Chemical Hazards or other guides.) When known atmospheres or potential situations exist that would affect the skin or eyes or be absorbed into the body through these surfaces. Consult standard references to obtain concentrations hazardous to skin, eyes, or mucous membranes. Potential situations include those where immersion may occur, vapors may be generated, or splashing may occur through site activities. Where atmospheres are oxygen deficient. When the type(s) and or potential concentration of toxic substances are not known. 	<ul style="list-style-type: none"> Positive-pressure full facepiece self-contained breathing apparatus (SCBA) or positive-pressure supplied air respirator with escape SCBA. Fully-encapsulating chemical protective suit. Chemical-resistant inner and outer gloves. Steel toe and shank chemical resistant boots. Hard hat under suit. Two-way radios worn inside suit. Optional: coveralls, long cotton underwear, disposable protective suit, gloves and boots, over fully encapsulating suit.
Level B	<ul style="list-style-type: none"> When respiratory protection is warranted and cartridge respirators are not appropriate. Examples of these conditions are: When work areas contain less than 19.5 percent oxygen, When expected contaminants do not have appropriate warning properties e.g. vinyl chloride, or When cartridges are not available to protect against all contaminants of concern. 	<ul style="list-style-type: none"> Chemical resistant clothes, long sleeves, hooded, one or two pieces. Positive-pressure full facepiece supplied air breathing apparatus or airline system with a 30-minute escape bottle. Hard hat. Inner gloves and chemical resistant gloves. Steel toe and shank boots. Optional: coveralls and disposable outer boots.
Level C	<ul style="list-style-type: none"> When respiratory protection is warranted and cartridge respirators are appropriate. When work areas contain at least 19.5 percent oxygen. 	<ul style="list-style-type: none"> Chemical resistant clothes, long sleeves, hood optional, one or two pieces. Full-facepiece, air purifying respirator equipped with cartridges suitable for the hazard. Hard hat. Inner gloves and chemical resistant gloves. Steel toe and shank boots. Coveralls and disposable outer boots.

Table 7-1 Level of Protection and Criteria		
Level of Protection	Criteria for Use	Equipment
Level D	<ul style="list-style-type: none"> • When level B or C is not indicated. • When airborne particulates do not warrant respiratory protection. • When work areas contain at least 19.5 percent oxygen. 	<ul style="list-style-type: none"> • Inner gloves and chemical-resistant gloves needed to handle soil or water samples. • Steel toe and shank boots. • Hard hat (ANSI Z89.1-1989 standard). • Eye protection (ANSI Z87.1-1989) standard. • Optional: coveralls and disposable outer boots.

Notes:

Level A protection will be selected when the highest available level of respiratory, skin, and eye protection is needed.

Contraindications for use of Level A:

- Environmental measures contiguous to the site indicate that air contaminants do not represent a serious dermal hazard.
- Reliable, accurate historical data do not indicate the presence of severe dermal hazards.
- Open, unconfined areas.
- Minimal probability of vapors or liquids (splash hazards) present which could affect or be absorbed through the skin.
- Total vapor readings indicate 500 ppm to 1,000 ppm.

Level B protection will be selected when the highest level of respiratory protection is needed, but cutaneous exposure to the small unprotected areas of the body, (neck and back of head) is unlikely, or where concentrations are not known to be within acceptable standards. Additionally, the permissible limit for exposure to mixtures of all site gases will be checked using the requirements of 1910.1000(d)(2)(ii) to ensure that PEL is not exceeded. If the value calculated using this method exceeds 1.0, Level B PPE is required.

Level C protection will be selected when the types and concentrations of inseparable material are known, or reasonably assumed to be no greater than the protection factors associated with air-purifying respirators, and exposure to the unprotected areas of the body is unlikely to cause harm.

Dust concentrations require Level C PPE, where the respirable fractions exceed the PEL of 5 mg/m³ or the total concentrations exceed the PEL of 15 mg/m³.

Level D protection will be chosen when measurements of atmospheric concentrations are less than 2 ppm above background levels and work functions preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemicals.

The Project Health and Safety Officer will determine the appropriate level of PPE prior to the initial entry based on the best available information. PPE requirements are subject to change as site information is updated or changes. **The decision to upgrade or downgrade levels of PPE shall be made by the Project Health and Safety Officer.**

Field activities which disturb soils will be initiated in Modified Level D protection except when stated otherwise in the SSHSP or site conditions (e.g., sampling results from previous studies) indicate that modified Level D is inappropriate. Modified Level D protection consists of a hard hat, appropriate chemical-resistant gloves (vinyl or nitrile), eye protection, and chemical-resistant, steel-toed and shank boots. Work coveralls (full length sleeves and pants) will be worn if free product or contaminants identified as skin irritants are encountered. This level of protection was selected because the levels of contamination detected in previous studies were low and free product was not detected.

PPE upgrades to Level C will be initiated if airborne concentrations exceeds 2 ppm above the background concentration in the breathing zone or if concentrations of any contaminant exceeds 50 percent of the OSHA PEL. See Table 7-1 for the specific criteria for use and the equipment required for each level of protection.

7.5.4 Air Monitoring

Previous site work indicates that workers may potentially be exposed to low concentrations of numerous chemicals including volatile organic compounds (VOCs), halogenated compounds, and combustible gases/vapors. Based on site history and existing sampling data, "worst case" contaminated areas will be identified prior to initiation of field activities.

Air monitoring using a photoionization detector (PID) and/or other appropriate sampling equipment will be conducted prior to beginning field activities at a new EZ and during ground disturbing activities. The PID will be field calibrated to measure VOCs relative to a 100 ppm

isobutylene standard. If VOCs are detected downhole, colorimetric detector tubes and/or other sampling media may be used to determine the identification and approximate concentration of these compounds.

A combustible gas indicator (CGI) will be used during all soil borings and well installations. The CGI will be field calibrated to measure flammable gases relative to a 23 percent lower explosive limit (LEL) methane standard. Downhole CGI readings will be collected continuously during all soil disturbing operations. Field activities will immediately cease if downhole readings exceed 10 percent LEL. If CGI readings do not subside, a careful investigation and mapping of the area will be made. Operations may not proceed until readings are below 10 percent LEL. The area will be immediately evacuated and the situation re-evaluated to determine how to proceed.

If breathing zone levels exceed 2 ppm or site conditions indicate that additional health and safety precautions are needed, field activities in the area shall stop. Field staff shall notify the Site Supervisor of the situation and he/she shall contact both the Project Manager and the Project Health and Safety Officer. The Project Health and Safety Officer will be responsible for reassessing the hazards and prescribing revised health and safety requirements as necessary, including upgraded PPE requirements, revised work schedules, and revised decontamination procedures. (Typically, PPE will be upgraded to Level C assuming that cartridge respirators are appropriate, otherwise Level B.) See Table 7-1 for specific criteria for each protection level. Work shall not proceed until breathing zone levels return to background levels, and it is reasonably anticipated that breathing zone samples will stay approximately at background levels; or the chemical constituent(s) are identified and appropriate PPE is donned.

Field monitoring values will be recorded in a field logbook and copies must be posted for field personnel review.

On a daily basis, PIDs, CGIs, and other monitoring equipment shall be calibrated or their proper function verified before being used. Throughout the day this equipment shall be periodically checked to ensure that it is working properly. A final calibration shall be conducted at the end of the work day at which time each instrument will be checked to ensure that it is free from surface contamination. Field staff shall record in their field notebooks the fact that they conducted these calibrations and checks and note whether the equipment was or was not functioning properly. When equipment is not functioning properly, it should be brought to the attention of the Site Supervisor or Site Health and Safety Officer who will arrange for repairs and/or replacement of that equipment as needed.

7.5.5 Procedures and Equipment for Extreme Weather Conditions

The seasonal climate in Memphis can be expected to be hot with high relative humidity in the summer months and moderately cold to extremely cold in the winter months. Therefore, heat-and-cold stress will be of concern for all personnel. Adverse weather conditions are important considerations in planning and conducting site operations. Extremes in hot and cold weather can cause physical discomfort, loss of efficiency, and personal injury.

7.5.5.1 Exposure to Hot Weather

Heat stress can result when the protective clothing decreases natural body ventilation even when temperatures are moderate. Various levels of personal protection may require wearing low permeability disposable suits, gloves, and boots which will prevent most natural body ventilation. Discomfort due to increased sweating and body temperature (heat stress) will be expected at the work site.

Heat stress is the metabolic and environmental heat to which an individual is exposed. The manifestations of heat strain are the adjustments made by an individual in response to the stress. The three most important categories of heat-induced illness are: heat exhaustion, heat cramps, and heat stroke. These disorders can occur when the normal responses to increased sweat

production are not adequate to meet the needs for body heat loss or when the temperature regulating mechanisms fail to function properly.

Heat exhaustion is a state of collapse brought about by an insufficient blood supply to the cerebral cortex portion of the brain. The crucial event is low blood pressure caused by inadequate heart output and widespread dilation of blood vessels.

Heat Exhaustion Factors — Factors which can lead to heat exhaustion are as follows:

- Increased dilation of blood vessels causing a decreased capacity of circulation to meet the demands for heat loss to the environment from exercise and from digestive activities.
- Decreased blood volume due to dehydration.
- Reduced blood volume due to lack of physical training, infection, intoxication (from industrial contaminants as well as from drinking alcohol), or heart failure.

Heat Exhaustion Symptoms — The symptoms include extreme weakness or fatigue, dizziness, nausea, or headache. More severe cases may also involve vomiting and possible unconsciousness. The skin becomes clammy and moist, the complexion pale, and the oral temperature stays normal or low, yet the rectal temperature is usually elevated (99.5°F - 101.3°F). Workers who are unacclimated run the highest risk.

Heat Exhaustion Treatment — In most cases, treatment of heat exhaustion is fairly simple. The victim will be moved to a cool place. If the victim is unconscious, medical assistance must be sought. Mild cases may experience immediate recovery; however, more severe cases may require several days care. No permanent effects have ever been reported.

Heat cramps result when the working muscles go into painful spasms. This may occur in people who perspire profusely in heat and who drink large quantities of water, but who fail to replace their bodies' salt. It is the low salt content in the blood that causes the cramping. The abdominal muscles as well as the muscles in the arms and legs may be affected. The cramps may appear during or even after work hours. Persons on a low sodium diet should not be given salt. A physician must be consulted for care of people with this condition.

Heat stroke is the most serious of the health problems that can arise while working in hot environments. It is caused by the breakdown of the thermo-regulatory system under conditions of stress. When this happens, perspiration stops, and the body can no longer regulate its own temperature.

Heat Stroke Symptoms — A heat stroke victim may be identified by hot, dry, and unusually red or spotted skin. The body core temperature can exceed 105°F. Mental confusion, irritability, and chills are common. These are all early warning signs of heat stroke; if the sufferer is not removed from the hot environment at once, more severe symptoms can follow, including unconsciousness, delirium, and convulsions, possibly ending in death.

Heat Stroke Treatment — Heat stroke must be treated as a major medical emergency; medical assistance must be summoned immediately.

Additional treatment:

- First aid must be administered.
- Individual must be moved to a cool location.
- Individual must be cooled through wetting, fanning, or immersion.

Care should be taken to avoid over-cooling and to begin treatment for shock by raising the legs. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

To reduce the potential for heat strokes:

- Drink plenty of fluids (to replace loss through sweating).
- Wear cotton undergarments to act as a wick to absorb moisture.
- Make adequate shelter available for taking rest breaks to cool off.

• **Additional Measures for Extremely Warm Weather:**

- Wear cooling devices to aid in ventilation. (NOTE: the additional weight may affect efficiency.)
- Install portable showers or hose down facilities to cool clothing and body.
- Shift working hours to early morning and early evening. Avoid the hottest time of the day.
- Frequently rotate crews wearing protective clothing (if required).

7.5.5.2 Exposure to Cold Weather

Persons working outdoors in temperatures at or below freezing may experience frostbite or hypothermia. Extreme cold for a short time may cause severe injury to the surface of the body. Areas of the body that have a high surface-area-to volume ratio, such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of cold injury: ambient temperature and wind velocity. As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air, thus, on a cold day the body can cool quickly when PPE is removed and if a person has wet clothing underneath.

Frostbite is a condition in which the cold temperature forms ice crystals in the cells and tissues, dehydrating protoplasm and killing tissues. At the same time, circulation of the blood is blocked. Frostbite could lead to gangrene and amputation.

Frostbite damage occurs in several degrees:

- **Frost nip, or incipient frostbite is characterized by sudden whitening of the skin.**
- **When superficial frostbite occurs, the skin has a waxy or whitish look and is firm to the touch; however, the tissue underneath has retained its resiliency.**
- **In deep frostbite, the tissues are cold, pale, and solid. The injury is severe. In addition to frostbite, other physiological reactions to cold may be experienced as well. Trench foot, for example, may result from prolonged exposure to low temperatures near, though possibly above, freezing. Walking on the foot is very painful. In very severe cases, the flesh dies and the foot may have to be amputated. Immersion foot is very similar although it is less severe. Although amputation is unusual, some mobility of the limb is lost. Blisters may occur around the lips, nostrils, and eyelids.**

Chilblain (pernio), which is an inflammation of the hands and feet caused by exposure to cold and moisture, is characterized by a recurrent localized itching, swelling, and painful inflammation on the fingers, toes, or ears, produced by mild frostbite. Such a sequence produces severe spasms and is accompanied by pain.

Hypothermia occurs when the body loses heat faster than it can produce it. The initial reaction involves the constriction of blood vessels in the hands and feet in an attempt to conserve the heat. After the initial reaction, involuntary shivering begins in an attempt to produce more heat.

Temperature is only a relative factor in cases of hyperthermia. Cases of exposure have occurred in temperatures well above freezing. Humidity is another important factor. Moisture on the skin and clothing will allow body heat to escape many times faster than when the skin and clothing are dry.

• Hypothermia occurs when the body's core temperature drops below 96°F. When this happens, the affected person becomes exhausted. He may begin to behave irrationally, move more slowly, stumble, and fall. The speech becomes weak and slurred. If these preliminary symptoms are allowed to pass untreated, stupor, collapse, and unconsciousness occur, possibly ending in death.

To reduce effects of cold exposure:

- **Stay dry.** When the temperature drops below 40°F, change perspiration soaked clothes frequently. When clothes get wet, they lose about 90 percent of their insulating value.
- **Beware of the wind.** A slight breeze carries heat away from bare skin much faster than still air. Wind drives cold air under and through clothing. Wind refrigerates wet clothes. Wind multiplies the problems of staying dry.
- **Understand cold.** Most hypothermia cases develop in temperatures between 30°F and 50°F. Cold water running down the neck and legs or cold water held against the body by wet clothes causes hypothermia.
- **Have shelter available.** Make adequate dry, warm shelter available.
- **Provide warm drinks.**

- **Never ignore shivering.** Persistent shivering is a clear warning that a person is on the verge of hypothermia. Allow for the fact that exposure greatly reduces normal endurance. Warmth generated by physical activity may be the only factor preventing hypothermia.

7.5.6 Personal Decontamination

A CRZ will be established immediate to each sampling/boring site and will include a station for decontaminating equipment and personnel. The CRZ will be covered with sheets of 6-mil polyethylene (typically an area 20-feet by 20-feet is sufficient) with specific stations that will accommodate the removal and disposal of the protective clothing, boot covers, gloves, and respiratory protection if required.

As a general rule, equipment will be decontaminated using a soap and clean water wash solution. Equipment decontamination will be completed by personnel in Level D PPE. In the event of inclement weather (e.g., lightning) or an emergency requiring immediate evacuation, all contaminated equipment will be wrapped and taped in 6-mil polyethylene sheeting and tagged as "contaminated" for later decontamination.

Personnel working in the CRZ will be in one Level of PPE lower than personnel in the EZ. For example, if personnel in the EZ are in Level B, decon workers will be in Level C.

7.5.6.1 Personal Decontamination Procedures

The decontamination procedures, based on Level D protection, will consist of the following:

- **Brushing heavily soiled boots and rinsing outer gloves and boots with soap and water.**
- **Removing outer gloves and depositing them in a plastic-lined container.**
- **Removing outer chemical protective clothing.**

- Washing and rinsing inner gloves.
- Hard hats and eye protection should be washed thoroughly at the end of each work day with a soap and water solution.
- Disposable gloves and any disposable clothing will be disposed of in sealable bags and placed in a clearly labeled 55-gallon drum for disposal by the Navy.
- All field personnel are to be instructed to shower as soon as possible after leaving the site.

Decontamination procedures will be conducted at the lunch break and at the end of each work day. If higher levels of PPE are needed, adjustments will be made to these procedures and an amendment will be made to this CHASP.

All wastes (soil and water) generated during personal decontamination will be collected in clearly labelled 55-gallon drums. The drums will be labeled and characterized by E/A&H or USGS personnel for final disposal by the Navy.

7.5.6.2 Closure of the Personal Decontamination Station

All disposable clothing and plastic sheeting used during site activities will be double-bagged and disposed of in a refuse container. Decontamination and rinse solutions will be placed in a clearly labeled 55-gallon drum for later analysis and disposal. All washtubs, pails, buckets, etc., will be washed, rinsed, and dried at the end of each workday.

7.5.7 Work Limitations

All site activities will be conducted during daylight hours only. All personnel scheduled for these activities will have completed initial health and safety training and actual field training as

specified in 29 CFR 1910.120(e). All supervisors must complete an additional 8 hours of training in site management. All personnel must complete an 8-hour refresher training course on an annual basis in order to continue working at the site.

7.5.8 Exposure Evaluation

All personnel scheduled for site activities will have had a baseline physical examination which includes a stressing exam of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems, pulmonary function testing, multi-chemistry panel and urinalysis, and will have been declared fit for duty. An exposure history form will be completed for each worker participating in site activities. An examination and updated occupational history will be repeated on an annual basis and upon termination of employment, as required by 29 CFR 1910.120(f). The content of the annual or termination examination will be the same as the baseline physical. A qualified physician will review the results of the annual examination and exposure data and request further tests or issue medical clearances as appropriate.

After any job-related injury or illness, there will be a medical examination to determine fitness for duty or any job restrictions. The Site Health and Safety Manager will review the results with the examining physician before releasing the employee for work. A similar examination will be performed if an employee has missed at least three days of work due to a non-job related injury or illness requiring medical attention. Medical records shall be maintained by the employer or the physician for at least 30 years following the termination of employment.

7.6 Medical Monitoring Program

All E/A&H or USGS personnel who enter hazardous-waste/spill sites or have the potential for exposure to hazardous materials from these sites must participate in the E/A&H Medical Monitoring Program or an equivalent program. The program is conducted by E/A&H's company doctor with the company Health and Safety Officer. The purpose of the program is to identify any pre-existing illnesses or problems that would put an employee at unusual risk

from certain exposures or respirators, and to monitor and evaluate exposure-related events where workers are involved in handling hazardous materials. Project managers should consult with the Health and Safety Officer and/or the company doctor concerning the scope of work and known or anticipated chemical hazards associated with each project.

• E/A&H maintains the right to exclude certain individuals from particular jobs based on reports from the company doctor. The program will be reviewed on an annual basis to determine its effectiveness. The company doctor has been employed as an independent contractor to provide medical monitoring for E/A&H.

The doctor is responsible for the following aspects of the Medical Monitoring Program:

- Selection and quality assurance of medical and laboratory services involved in carrying out the monitoring program.
- Development of a uniform medical record.
- Record retention.
- Employee notification of examination results.
- Determination of content of the medical and biological monitoring programs.
- Record review and correlation between potential exposure and effect.
- Monitoring job-related illness and injury for each employee.

7.6.1 Preplacement Examinations

Each E/A&H employee will be given a preplacement examination: to identify any preexisting illness or problem that would put the employee at an unusual risk from certain exposures; to assure that each employee can safely use negative-pressure respirators; and to develop a database to assess any exposure-related events detected during periodic medical monitoring. Data accumulation will include variables such as age, sex, race, smoking history, prior employment history, and other conditions that might bear upon the occurrence of subsequent events once employment begins.

The preplacement examination includes:

- Occupational history including previous chemical and carcinogenic exposures.
- Medical history including demographic data, family history, personal habits, past medical history, and a review of current systems.
- Fertility history.
- Physical examination stressing the neurologic, cardiopulmonary, musculoskeletal, and dermatological systems.
- Physiological parameters including blood pressure and visual acuity testing.
- Pulmonary function testing including FVC, FEV₁, and FEV₂₅₋₇₅.
- Electrocardiogram.
- PA and lateral chest X-ray.

- A multi-chemistry panel including tests of kidney and liver function.
- Red blood cell cholinesterase.
- Audiogram.

The history, physiological parameters, X-ray, screening tests, and laboratory studies will be conducted before the physical examination. After the physical examination, the medical examiner will review the results of the examination and special studies with each employee and facilitate referral for further evaluation of abnormalities detected during this examination. The Site Health and Safety Officer will provide each employee with a written summary and detailed results of the examination along with identification of any job restrictions. Additional medical testing procedures (e.g., ophthalmology/optometric assessment, specialized audiometric testing, etc.) may be required at the discretion of E/A&H's attending physician.

7.6.2 Periodic and Exit Examinations

An examination and updated occupational history will be repeated annually and include:

- Updated occupational and medical history.
- Physical examination stressing the neurologic, cardiopulmonary, musculoskeletal, and dermatological systems.
- Pulmonary function testing including FVC, FEV₁, and FEV₂₅₋₇₅.
- Multi-chemistry panel including tests of kidney and liver function.
- Urinalysis.

The company doctor will review the results of annual examination and exposure data and request further tests or issue medical clearances as appropriate. An examination will also be administered when an employee leaves the company. The company doctor will be consulted for the contents of the exam except when the employee has had an exam within 6 months, or when there has been no site work since the last examination.

7.6.3 Return-to-Work Examinations

After any job-related injury or illness, a medical examination is required to determine fitness for duty or to identify any job restrictions. The medical examiner will review the results of this back-to-work examination with the company doctor before releasing the employee for work. A similar examination will be performed if an employee has missed at least three days of work due to a non-job-related injury requiring medical attention.

7.6.4 Confidentiality

Medical records will be maintained in a confidential manner so that only authorized persons will have access to the records. The authorized personnel will include medical staff of the joint venture or contract medical personnel, the individual, the individual's personal physician, or the individual's designated representative. Upon written request, the individual may obtain a copy of the medical file which will be provided within 15 days of the receipt of the written request. Information used for research, testing, statistical, or epidemiologic purposes will have all identifying data removed including the identity of the individual. Any medical information or findings obtained which do not affect the individual's job performance will not be made available to E/A&H in order to maintain the patient-physician confidentiality. Upon death, retirement, resignation, or other termination of services, the records will be retained by E/A&H or contracting physician.

7.7 Authorized Personnel

Personnel anticipated to be onsite at various times during site activities include:

- Principal-In-Charge — Dr. James Speakman (E/A&H)
- Task Order Manager — Mr. Lawson Anderson (E/A&H)
- Project Manager — Ms. Ginny Gray (E/A&H)
- Project Health & Safety Officer — Mr. Doug Petty (E/A&H)
- Field Environmental Scientist — Mr. Robert Smith (E/A&H)
- Field Geologist — Mr. Ben Brantley (E/A&H)
- Site Supervisor — To Be Determined
- Site Health & Safety Officer — To Be Determined
- Engineer-in-Charge — Mr. Mark Taylor (SOUTHDIV)
- Naval Air Station Memphis, Tennessee Site Contact — Ms. Tonya Barker

7.7.1 Responsibilities of Site Supervisor

The Site Supervisor will direct the site operations and, relative to health and safety, is responsible for assuring that:

- Field staff follow the CHASP, SSHSP, and other safety and health standard operating procedures (SOPs). Personnel that do not comply are retrained and/or instructed to leave the site and not allowed to return.
- Field staff have current HAZWOPER training.
- Field staff know who the Site Health and Safety Officer is.
- Field staff know the site-specific safety and health concerns.
- There is an adequate onsite supply of health and safety equipment.

- Field staff participate in the E/A&H Medical surveillance program (or in the case of subcontractors, an equivalent program).
- Field staff attend safety and health "kick-off" orientation and other site safety briefings.
- The Site Supervisor is also responsible for assuring that field staff who may be exposed to unique or special hazards have the training or experience necessary to safely conduct their work.

7.7.2 Responsibilities of Site Health and Safety Officer

The responsibilities of the Site Health and Safety Officer include:

- Providing the Site Supervisor with technical input on site health and safety issues.
- Observing field personnel and reporting to the Site Supervisor on the effectiveness of the CHASP and SSHSP, and observing whether field staff are utilizing proper work practices and decontamination procedures.
- Reporting significant safety violations to the Project Manager and/or Project Health and Safety Officer.
- Conducting safety briefings during field activities.
- Assuring that a copy of the Health and Safety Plan is maintained onsite during all field activities.
- Maintaining a file of HAZWOPER training certificates and appropriate refresher training certificates for onsite personnel.

The Site Health and Safety Officer will have the following qualifications: (1) 40 hours OSHA training or equivalent experience, (2) 24 hours of supervisory training or equivalent experience, (3) knowledge of the health and safety concerns for the specific work tasks being conducted, and (4) shall be trained to use the air monitoring equipment; be able to interpret the data collected with the instruments; be familiar with symptoms of chemical exposure, heat stress, and cold exposure; and know the location and proper use of onsite safety equipment. He will also be familiar with this CHASP.

The position of Site Health and Safety Officer may rotate. Often, particularly on small projects, this function is not a full time responsibility. Rather, a member of the field team is selected to serve as the Site Health and Safety Officer during a particular task. When that task is completed and/or field staff change, the Site Health and Safety Officer may change as well.

The following criteria outline when the Site Health and Safety Officer will be replaced: (1) termination of employment, (2) end of work task, (3) end of shift, (4) sickness, (5) injury, or (6) death. The SAP calls for one work shift per day. If circumstances arise that require multiple work shifts, an alternate Site Health and Safety Officer will be designated.

7.7.3 Responsibilities of Onsite Field Staff

The health and safety responsibilities of field staff include:

- Being familiar with and complying with the CHASP and SSHSP.
- Attending site health and safety briefings and being aware of anticipated chemical, physical, and biological hazards and knowing what to do when these hazards are encountered.
- Being properly trained on PPE use, safe work practices, decontamination procedures to be followed, and emergency procedures and communications.

- Properly utilizing required PPE, including respiratory protective equipment.
- Having up to date HAZWOPER training and then providing the Site Supervisor with documentation that their training is current.
- Being an up to date participant in an acceptable medical surveillance program.
- Using the buddy system when wearing respiratory protective equipment. When working in Level C or higher, a third person shall be at the work area. This person shall be suitably equipped to provide logistical and safety support to the entry team.
- Being fit-tested and physically capable of using a respirator. Should the use of respiratory protection be required, then field workers shall not have facial hair which interferes with achieving a proper fit.

In addition, field staff should always be alert and use their senses (sight, smell, etc.) to identify and react to potentially dangerous situations. When working in the EZ, visual contact should be maintained between personnel and field personnel should be close enough to assist each other during an emergency. Procedures for leaving a contaminated area must be planned and implemented before going onsite in accordance with the SSHSP.

The number of personnel and equipment in the contaminated area should be kept to a minimum in order to achieve effective site operations. All visitors to the job site must comply with the SSHSP procedures. PPE may be modified for visitors depending on the situation. Modifications must be approved by the Project Health and Safety Officer.

7.8 Emergency Information

All hazardous-waste site activities present a potential risk to onsite personnel. During routine operations risk is minimized by establishing good work practices, staying alert, and by using proper PPE. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

If any situation or unplanned occurrence requires outside or support service, Ms. Tonya Barker, NAS Memphis Site Contact, will be informed and the appropriate contact from the following list will be made:

Contact	Agency or Organization	Telephone
Tonya Barker	Naval Air Station, Memphis	(901) 873-5461/5462
Mark Taylor	SOUTHDIIV Engineer-in-Charge	(803) 743-0573
Law Enforcement	NAS Memphis Base Security	9-911
Fire Department	NAS Memphis	9-911
Ambulance Service	Naval Hospital, Millington Navy Road	(901) 873-5801/5802 or 9-911
Hospital	Methodist North Hospital 3960 Covington Pike	(901) 372-5211 or 9-911
Southern Poison Control Center	—	(901) 528-6048
Lawson Anderson	EnSafe/Allen & Hoshall Memphis, Tennessee	(901) 372-7962
Doug Petty	EnSafe/Allen & Hoshall	(901) 372-7962

Mark Taylor, SOUTHDIV Engineer-in-Charge will be contacted after appropriate emergency measures have been initiated onsite.

7.8.1 Site Resources

Cellular telephones will be used for emergency use and communication/coordination with NAS Memphis. First aid and eye wash equipment will be available at the work area.

7.8.2 Emergency Procedures

Conditions which may constitute an emergency include any member of the field crew being involved in an accident or experiencing any adverse effects or symptoms of exposure while onsite, or if a condition is discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- Site work area entrance and exit routes will be planned and emergency escape routes delineated by the Site Health and Safety Officer.
- If any member of the field team experiences any effects or symptoms of exposure while on the scene, the entire field crew will immediately halt work and act according to the instructions provided by the Site Health and Safety Officer.
- For applicable site activities, wind indicators visible to all onsite personnel will be provided by the Site Health and Safety Officer that indicate possible routes for upwind escape.

- The discovery of any conditions that would suggest the existence of a situation more hazardous than anticipated will result in the suspension of work until the Site Health and Safety Officer has evaluated the situation and provided the appropriate instructions to the field team.
- If an accident occurs, the Project Manager is to complete an Accident Report Form (See Attachment C) for submittal to the managing principal-in-charge of the project.
- If a member of the field crew suffers a personal injury, the Site Health and Safety Officer will call (901) 372-5211 or 9-911 (serious injury) to alert appropriate emergency response agencies, or administer onsite first aid (minor injury) as the situation dictates. An Accident Report Form will be completed for any such incident.
- If a member of the field crew suffers chemical exposure, the affected body areas should be flushed immediately with copious amounts of clean water, and if the situation dictates, the Site Health and Safety Officer should alert appropriate emergency response agencies or personally ensure that the exposed individual is transported to the nearest medical treatment facility for prompt treatment. (See Attachment B for directions to the emergency medical facility.) An Accident Report Form will be completed for any such incident.

Additional information on appropriate chemical exposure treatment methods will be provided through MSDS in Attachment A of each SIP. Directions to the nearest emergency medical facility capable of providing general emergency medical assistance and treating chemical burns

are provided in Attachment B of this CHASP. Directions from individual sites to the NAS Memphis South Gate will be provided as Attachment B of each SIP.

7.9 Forms

The following forms will be used in implementing this CHASP:

Plan Acceptance Form
Plan Feedback Form
Exposure History Form
Accident Report Form

A SSHSP Plan Acceptance Form will be filled out by all employees working on the site before site activities begin. The Plan Feedback Form will be filled out by the Site Health and Safety Officer and any other onsite employee who wishes to fill one out. The Exposure History Form will be completed by both the Project Manager and the individual(s) for whom the form is intended. Examples of each form are provided in Attachment C of this plan.

All completed forms must be returned to the Task Order Manager at EnSafe/Allen & Hoshall, Memphis, Tennessee.